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RIOMETER INVESTIGATIONS ON THE FRAM I ICE ISLAND.(U)
FEB 81 T J ROSENBERG N00014-79-C-0158

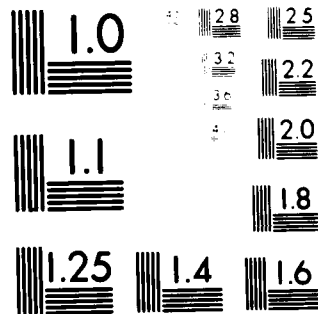
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11 February 1981
9 FINAL REPORT

15 CONTRACT: N00014-79-C-0158 ✓

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6 SPONSOR: Office of Naval Research

TITLE: RIOMETER INVESTIGATIONS ON THE FRAM I ICE ISLAND.

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Research Professor

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Summary

The objectives of this study were 1) to use a riometer with high sensitivity and time resolution to resolve electron-induced ionospheric absorption fluctuations in the polar cap and 2) to search for correlations with intensity variations of magnetospheric ELF/VLF radiowave emissions. Detailed correlations, if found, would provide support for the importance of electromagnetic wave-particle interactions as a mechanism leading to electron precipitation in the polar cap. K

Due to technical problems encountered in the field with the recording system, usable data were limited to an interval of approximately two weeks at the end of the observational period. Furthermore, owing to difficulties encountered by the University of Oslo in extracting data from the field-generated tapes, the bulk of the usable riometer data have not yet been sent to the University of Maryland for analysis. Thus, at this time we are not able to assess fully the accomplishments of the program.

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Field Activities

The University of Maryland instrument, a 30 MHz riometer with broadbeam antenna (30° from the zenith to the half-power points) was placed on FRAM I and operated by personnel of the Norwegian Polar Institute, in conjunction with the University of Oslo's ELF/VLF experiment. A common digital data acquisition system was used. The riometer was capable of resolving weak absorption fluctuations ($\geq 0.02\text{dB}$) at high time resolution ($\leq 1\text{ sec.}$).

Geophysical activity, as determined by the ELF/VLF detector was quite low during the period of FRAM I operations. All instruments appeared to have functioned well, but some problems were experienced with the data recording system. For the observational period prior to April 27, 1979, it has been determined that the riometer/VLF data are unrecoverable owing to these technical problems, principally mechanical difficulties with the modified digital cassette recorder. However, sufficient improvements were made to produce good quality recordings from this time until the end of observations during the second week in May. The University of Oslo ELF/VLF measurement was, for the most part, saturated below 1 kHz by harmonics of the 60 Hz power distribution system on the island.

Data Processing

A digital magnetic tape of the riometer data for April 27 and 28, 1979 has been obtained from the University of Oslo. We are still awaiting the remainder of the data.

We have verified that the 30 MHz riometer operated properly. Some variations of signal level seem indicative of weak absorption fluctuations. The high frequency ELF/VLF channels ($> 1\text{ kHz}$) will be examined for evidence of natural wave emission activity. Dr. Einar Gj  en of the Geophysical Institute, University of Bergen, who was responsible for the scalar (total field)

magnetometer measurement on FRAM I, has sent annotated copies of his chart recordings of micropulsation activity. Although the sensitivity of his recordings was quite limited, there remains the possibility of searching for correlative relationships in the riometer/magnetometer data when the remainder of the riometer data are received.

Any future findings or publications pertaining to the riometer data obtained under this contract will be submitted to the Office of Naval Research as a supplement to this final report.

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